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Body condition scoring of Hermann's tortoises (*Testudo hermanni*) and comparison to known objective body condition measurements

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The body condition score (BCS) is a subjective, semi-quantitative method of evaluating body fat and musculature and is used in numerous species such as cats, dogs, poultry, horses and cattle. Recognizing obesity (or the contrary, emaciation) is very important in tortoises kept as pets or as part of a collection in zoos, because it gives an indication of the animals' health status. In tortoises, one subjective body condition score could be found for desert tortoises as well as different pre-existing objective body condition indices (BCI), which use different calculations that include body weight (BW) and straight carapace length (SCL). For example, the Jackson's ratio uses BW/SCL to predict body condition; another condition index uses the log (BW/predicted BW), where predicted BW = $a \times \text{SCL}^b$. For this calculation $a = -3.024$ and $b = 2.684$ was used for females and $a = -3.322$ and $b = 2.811$ was used for males respectively, using published data for the Hermann's tortoises (*Testudo hermanni*) for the month of September. The different BCI must be applied with caution, because the information of body mass itself does not need to only relate to body condition but may represent for example eggs carried by a female.

34 Hermann's tortoises (24 males and 10 females), stationed at the "Auffangstation für Reptilien" in Munich (reptile rescue centre, RRC) were subject of this study. The sexes were kept in separate enclosures to prevent breeding. The enclosures were in a large greenhouse with natural earth flooring and natural vegetation. The tortoises were fed each day with different green forages and had free access to cuttlefish bones and the vegetation in the enclosure. Each tortoise had its BW and SCL measured. The examination took place in September, before hibernation. Manual palpation of the cervical vertebrae (sharp, easy palpable, palpable, palpable with pressure) and the tail vertebrae (sharp, easy palpable, palpable, palpable with pressure) were assigned to specific scores by three veterinarians. A BCS (mean of examiners' scores) was given to each tortoise according to the manual palpation. The BCS system was chosen to range from 1-5 in 0.25-point steps, with 2.5 considered as ideal BCS.

For the studied tortoises, BCS ranged from 1.25 to 2.75. Out of 34 tortoises, 1 tortoise was scored with a 1.25, 5 tortoises were scored with a 1.5, 5 tortoises with a 1.75, 5 tortoises with a 2, 8 tortoises with a 2.25, 7 tortoises with a 2.5, and 3 tortoises with a 2.75. The mean (\pm standard deviation) BW was 805 ± 305 g, the median SCL was 15.9 ± 5.6 cm. The BCS did neither correlate with the Jackson's ratio nor with the condition index (log (BW/predicted BW)). The BCS scores were significantly higher in the females than in the males.

Out of 34 tortoises at the RRC, 24 were considered below ideal body condition, 8 had a Jackson's ratio below 4 (which was suggested to be too low for hibernation for animals of this body size) and 6 had a condition index of < -0.1 , which is equivalent to an observed mass below 80% of the predicted mass. Most of the animals with a low BCS were males. This might be explained through a higher level of stress in the enclosure, as the males were sexually active and a high level of competition was evident. It is possible that the BCS and the BCI did not correlate in the studied population because no electronic callipers were used to measure SCL.

A BCS of a tortoise includes a manual palpation of the animal and thus gives the examining veterinarian additional information to the objectively measured or calculated index. Therefore, it is always preferable to use a BCS over a BCI.

KEYWORDS: Hermann's tortoises, body condition score, Jackson ratio